

Sealing the envelope

Small measures can equal great gains in efficiency



Air sealing Checklist

BY MAGGIE LESLIE
Air sealing is a crucial part of building a healthy, energy-efficient home. Below is a checklist of items to use to ensure proper air sealing when building or renovating a conventional stick-frame home. A leaky home will decrease the R-value of your insulation (the measure of how well your insulation resists heat flow), create unwanted drafts and comfort issues, and bring moisture and pollutants into the home. As the saying goes, "Seal it tight, and insulate it right!"

- All holes or penetrations in the building envelope are sealed with

- a material capable of stopping air-flow, such as caulk, foam or rigid material (fibrous insulation does not stop airflow).
- Windows and exterior doors are sealed with backer rod, caulk or non-expanding spray foam.
- Electrical, plumbing and HVAC penetrations between conditioned and unconditioned space are sealed with caulk or spray foam.
- The bottom and top plates of exterior walls and walls to the attic are sealed with caulk or sill seal.
- Band joists are sealed with caulk, spray foam, or gasketing between the top plate and band joist, between band joist and subfloor and at any penetration. Any joists or

- other cavities that span from conditioned to unconditioned spaces are blocked off and air sealed.
- All chase ways that would allow unconditioned air to enter into the conditioned building envelope are capped and sealed.
- Exterior walls behind tub and

- shower enclosures are insulated. Prior to installing the tub or shower, a rigid, durable air barrier is installed in direct contact with the insulation.
- Insulation wind baffles to block windwashing at all attic eave bays in roof assemblies with soffit vents are installed.
- An air barrier is blocking any exposed edges of insulation, particularly for cantilevered floor systems and floors above a garage.
- For fireplace cavities on exterior walls a rigid air barrier is fully aligned with the insulated framing in the framed shaft behind the fireplace and any gaps are fully sealed with foam, caulk or tape.
- Recessed light fixtures (if installed in insulated cavities, such as the ceiling between the house and the attic) are rated ICAT (Insulation Contact, Air Tight). Once installed, they are sealed to the drywall with gasket, caulk or foam.

Sources for this fact sheet include *Advanced Energy System Vision Guidelines, Southface Energy Institute Technical Bulletins, HealthyBuilt Homes program guidelines and Energy Star guidelines for homes and indoor quality.*



Air sealing a home is critical for maximum energy efficiency. Donated photo



Sealing leaks around ductwork improves efficiency. Donated photo

HVAC Checklist

BY MAGGIE LESLIE
A home can be heated or cooled using electricity, gas, geothermal energy, solar energy or a combination of energy sources. Radiant floor-heating systems are an inherently efficient way to heat, since there is no heat lost through ductwork, but a forced-air heating system can also be a very efficient option if designed and installed properly. The items on this checklist should be considered when installing any type of ducted system.

- First off, a room-by-room manual J heat-loss/heat-gain calculation must be completed. The maximum-oversizing limit for air conditioners and heat pumps is 15 percent. Adhering to the maximum-oversizing limit both ensures that you are not paying for more capacity than you need and that the system will properly dehumidify the home and run efficiently.
- Heat pumps and air conditioners have a Seasonal Energy Efficiency Ratio rating of at least 14 SEER and a Heating Season Performance Factor of at least 7 HSPF. Gas furnaces used for either primary heat or back-up heat have a rating of at least 90 Annual Fuel Utilization Efficiency.
- Ductwork are located and the mechanical unit in the conditioned space, if possible. All ductwork has an insulating value of R-8.
- Use rigid-metal ductwork for increased durability and air quality. Rigid metal is easy to clean, and will not trap dust or absorb moisture.

- Building cavities, such as floor joists, are not used as part of the forced-air supply or return system.
- All joints/seams in the air-distribution system are sealed using fiberglass mesh tape and duct mastic; this includes duct connection to metal boots (in subfloor), trunk lines and air-handler units. The insulating liner of the ducts is also sealed with mastic.
- Indoor and outdoor HVAC units are matched according to the Air-Conditioning & Refrigeration Institute Directory or the manufacturer's listing.
- The correct charge of refrigerant has been installed per the manufacturer's specifications.
- Registers and diffusers have proper throw and spread to keep rooms properly conditioned as the load specifies.
- Duct dampers are installed and accessible on supply vents. The dampers make it possible to adjust the flow and spread of air from the registers.
- Ducts are sealed and tested by a Home Energy Rater to have no more than 5 percent leakage.
- If installing a heat pump, an outdoor thermostat is installed to control when the electric heat strip's power is on. This will maximize your efficiency.
- A programmable thermostat is installed.

Sources for this fact sheet include *Advanced Energy System Vision Guidelines, Southface Energy Institute Technical Bulletins, HealthyBuilt Homes program guidelines and ENERGY STAR guidelines for homes and indoor quality.*

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